Adaptation Lived as a Story
Why We Should Be Careful about the Stories We Use to Tell Other Stories

Nicole Klenk

Abstract: Within the field of climate change adaptation research, "stories" are usually simply mined for data, developed as communication and engagement technologies, and used to envision different futures. But there are other ways of understanding people's narratives. This article explores how we can move away from understanding stories as cultural constructs that represent a reality and toward understanding them as the way in which adaptation is lived. The article investigates questions such as the following: As climate adaptation researchers, what can and should we do when we are told unsolicited stories? How can storytelling, as a way of life rather than as a source of data, inform and elaborate scientific approaches to adaptation research and planning? In this article, I move away from the literature that seeks to develop narrative methods in adaptation science. Instead, I focus on stories that we do not elicit and the world-making practice of storytelling.

Keywords: adaptation governance, dialogue, futures research, interventions, narrative knowing, ontological pluralism, performative analysis, philosophy of social science

We are storytelling animals (Gottschall 2012). Stories help us make sense of the messiness of life (Polkinghorne 1988) and events that shatter our hopes and dreams; they provide us with the means to inherit our entangled pasts and envision better or at least more meaningful futures. But stories do not only give meaning to our lives: we also use them to reason. They serve as virtual reality laboratories, enabling us to "try out" ideas and paths of action to address a problem (Gottschall 2012). Scientists have used stories to connect disparate data, articulate theories, and produce compelling knowledge. As Mary Morgan (2017: 2) has noted, "Narrative explanations are sites in which scientists get to know things through narratives, not because the narratives provide illustrative examples for theories or models or something else, nor because it is 'merely' rhetoric (though rhetoric is never 'mere') but because narrative is how the relationship amongst materials become known to them."

Scholarship on narratives in climate change research has recognized the importance of understanding the significance and processes of telling stories (Lejano et al. 2013; Paschen and Ison 2014). As Mike Hulme (2012: 20) has beautifully said: "We cannot capture, even less predict, these meanings of climate-sometimes enduring, often fleeting, always personal. We can only create them and re-recreate them by telling our tales, our different tales . . . and living them." Within this body of literature, stories are mainly understood as cultural constructs: representations of reality that are meaningful to particular people in particular contexts. Stories are considered useful ways to communicate with, influence, and engage audiences, as well as sources of data, a means to envision different futures, and powerful discourses framing global climate change policy (see special issues on this topic in the *Journal of Historical Geography* 2009 and *Energy Research and Social Science* 2017; see also Bremer et al. 2017; Bushell et al. 2015; Flottum and Gjerstad 2017; Jackson 2015; Kok et al. 2015; Moezzi et al. 2017). Scholars have begun to design rigorous methodologies to use narratives in climate change research, but understanding stories and storytelling as cultural constructs from a representationalist perspective has its limitations.

In this article, I argue that when conducting research about climate change adaptation, "it matters what stories we use to tell other stories" (Haraway 2016: 12). Narratives are not simply a source of data to be extracted, translated, and parsed for use in adaptation mapping, modeling, and planning processes. Nor are they simply communication strategies to change people's environmental behaviors or inform them about the latest climate change science. Stories are not static objects; they are alive with social lives. My central question is: How can storytelling, as a way of knowing, inform and elaborate scientific approaches to adaptation research and planning?

To make my argument, I will draw from anthropological studies of oral narratives of Indigenous peoples (Cruikshank 1998, 2005; Doerfler et al. 2014), recent philosophical scholarship of social sciences practices (Savransky 2016a), and materialist feminist arguments for understanding discursive practices like storytelling as performative (Barad 2007), exploring the implications of understanding adaptation lived as a story for climate change adaptation research theory and practice. To illustrate and support my argument, I will present a case study of a community-led vulnerability assessment in New Brunswick, Canada. Stories were not intentionally solicited as part of this assessment, but the process was punctuated with personal and community experiences and tales of

floods, culverts, dams, and decision-making in response to the effects of climate change.

In this article, I move away from the literature that seeks to develop narrative methods in adaptation science. Instead, I argue that place-based stories are local knowledges that can reveal what matters and is therefore relevant to the people we engage in adaptation research, especially when we pay attention to what these stories "say" and "do" and seek to understand the relations that compose them within and beyond particular research encounters. From this perspective, unsolicited narratives about people's lives, livelihoods, and environmental and social relationships may change how researchers produce knowledge to inform adaptation decision-making. When adaptation research is understood as an intervention in storytelling, it calls forth new obligations and "response-abilities" for how researchers tell, silence, parse, transform, and experience place-based stories. My goal is not to reconcile different theoretical positions into a single integrated perspective on narratives in adaptation research but rather to explore, along with other scholars, how to articulate the world-making practice of storytelling.

Why What Stories We Use to Tell Other Stories Is Important

As researchers, what should we do when our research subjects tell us that stories are living beings or that climate change is God's punishment for humanity's arrogance, or engage in any other activity or discourse that we would be tempted to label "irrational"? According to the anthropologist Martin Holbraad and his colleagues (2014: 902), "culture provides an answer: you say that the people in question have different 'beliefs' than you do." Different cultures are characterized as sets of ideas, practices, and ways of knowing that are said to "belong" to different groups of people.

From a modern, Western science perspective, contradictory beliefs, such as "stories are living beings" and "stories are cultural constructs," are understood as a disagreement over the truth value of the statements. "Stories are living beings" cannot be a true statement according to Western science, and "no amount of relativist fudge can get us out of the fact that as far as we are concerned, these people are saying something wrong" (Holbraad 2010: 184). The philosopher of social science Martin Savransky has noted that science has regularly been pitted against storytelling's hallmarks of invention, imagination, and passion:

In other words, while literature is deemed valuable precisely because it is assumed to be *fictional*, that is, not owing to reality, the alleged value of modern science, the value that is mobilized to authorize the Western scientific endeavor as an imperialistic, colonizing, crusade, is indeed the opposite: unlike pre-modern, non-Western forms of representation and knowledge—which confuse facts with fiction, myth and belief—modern, Western Science is said to be the only mode of knowing that is entirely factual and owes nothing to fiction. (2012: 355, emphasis in original)

In other words, the dichotomy between facts/values and objectivity/subjectivity that the modern, Western science perspective upholds shores up the claim that only science can tell the truth, while stories are cultural constructs and potentially useful beliefs. Instead of understanding science and storytelling as representational—in the business of producing accurate and reliable representations of reality—Holbraad argues that we should take an ontological perspective on different ways of knowing:

Ontology's better answer is that if these things 'appear irrational' it is because we have misunderstood them. If people say that a stone is a person, it is because they are talking about something different from what we talk about when we say it is not. So the difference in question is not one between two sides disagreeing about things, but rather between two sides speaking about different things. (2010: 902)

In *The Story Is a Living Being*, two Indigenous studies scholars argue that the theoretical and experiential approach we take to understanding what stories "are" circumscribes what stories can "do." They recount an Anishnaabeg myth about a woman whose husband dies and who flees to the forest in desperation. She sits under a tree, which teaches her how to weave a birch bark basket, a new skill to impart to her community, thereby giving her a renewed will to live. Telling this story is a world-making act. The story has a life, inviting listeners and readers to dwell in the experience recounted, encounter the reality it makes possible, and question our ideas. Enmeshed in an experiential, emotional, and material world, "the story is able to procreate in the act of telling, it is not identical with the words people use to tell it in the telling." The authors illustrate this with an analogy:

Here is a way to think about [sacred] stories. Suppose you have a garden planted. It exists regardless of who knows about it. At every moment, things are changing all around the garden. The light and the weather are in flux. There may be different animals coming and going. But that garden will hold its shape and size, its directional orientation. It will also influence the conditions of the day, the region, the people. It's like that with a story. Even when no one is visiting the story, it is living. . . . It's a living part of its living context. (Garroutte and Westcott 2014: 68)

The authors argue that understanding stories as cultural constructs implies that stories can only represent reality, not cocreate it through its (re)telling. In contrast, when stories are understood as living beings, their telling can open listeners to the possibility of experiencing another reality.

An ontological perspective requires imagination and a willingness to rethink our ideas. To paraphrase Holbraad (2010), when people say that stories are living beings, the goal is to understand what they are actually saying, as opposed to focusing on why this representation of reality is silly. Thus, researchers must reconceptualize a whole host of ideas. They must literally rethink what a story is, and what a living being might be, for the equation of one with the other to even make sense. This recursive practice is not only discursive (both meaningful and embodied) but also performative: it is part of the reality it seeks to understand.

The materialist feminist scholar Karen Barad argues that a performative understanding of discursive practices such as storytelling moves from constructing knowledge through signification and representation to practices, doings, and actions that "bring to the forefront important questions of ontology, materiality, and agency" (2003: 802) From this perspective, knowledge practices have material consequences, and practices of knowing are specific material engagements that participate in (re)configuring the world: "Scientific practices must therefore be understood as interactions among component parts of nature and that our ability to understand the world hinges on our taking account of the fact that our knowledge-making practices are social-material enactments that contribute to, and are a part of, the phenomena we describe" (Barad 2007: 26). Thus, when we understand science and adaptation as storytelling, we are referring to not how stories produce accurate representations of an independent reality but the real consequences, interventions, creative possibilities, and responsibilities of telling our and others' stories.

To understand stories as representations of reality maintains an ontological distinction between representations and that which they purport to represent. Yet, stories of science for adaptation come from direct material engagement with the world. The discursive apparatus we enact enables us to tell some stories but not others. For example, vulnerability assessments tell stories about protagonists and their capacities to address troubles beyond their control. Will Indigenous peoples' traditional ecological knowledge keep pace with climate change? Will individuals change their behaviors to protect themselves from floods? Will communities be able to withstand sea level rises?

Vulnerability assessments are interventions—world-making practices: they shape particular story lines by embedding global narratives of climate change within local individual and collective narratives about the past (extreme weather events, disasters), present (ongoing successes and challenges of addressing environmental change), and imaginaries of the future. As Barad points out, what is at issue is precisely the nature of these enactments:

> Which practices we enact matter—in both senses of the word. Making knowledge is not simply about making facts but about making worlds, or rather, it is about making specific configurations—not in the sense of making them ex nihilo, or out of language, beliefs, ideas, but in the sense of materially engaging as part of the world in giving it specific material form. (2007: 91)

The significance of this performative perspective for our encounters with stories in climate change research involves responsibility:

> Each time a story helps me remember what I thought I knew, or introduces me to new knowledge, a muscle critical for caring about flourishing gets some aerobic exercise. Such exercise enhances collective thinking and movement in complexity. Each time I trace a tangle and add a few threads that at first seemed whimsical but turned out to be essential to the fabric, I get a bit straighter that staying with the trouble of complex worlding is the name of the game of living and dying well together on terra, in Terrapolis. (Haraway 2016: 29)

We are responsible for the stories of which we are a part and that we encounter, not because they are cultural constructs of our choosing but because they sediment reality out of their particular social lives: how they are told and retold, by whom, when, where, and to what effect. When we encounter a story, however "irrational," disruptive, or seemingly irrelevant to our purposes, we have a role in inheriting its reality, and, through this encounter, we can question our concepts and practices (Savransky 2016a). Our scientific methods must invent ways to respond to the modes of mattering with which they are involved. As Savransky notes, "it is through this risky, inventive process of inheritance and creativity" (2016b: 14) that encounters with stories can be made fertile.

The concept of "encounters" is crucial to shifting our understanding of stories from cultural constructs that represent reality to performative achievements. For Savransky, the encounter "designates, first and foremost, a mode of relationality characterised by the contingency of a coming into contact of various forms of mattering or patterns of relevance" (2016a: 90). Thus, relationality is experienced between

enduring subjects who have their own habits and stories that exist as a composition in their own right, and which we must inherit when we enter in relation with them. To encounter someone's story is to be open to learning from it: what relations is the story composed of? Hence, to encounter requires being attuned to difference in all its manifestations: each story embodies a unique pattern of relations and modes of relevance.

Moreover, to think with stories, we must pay attention not only to what a story is "about" and what it "does" but also to what relations compose it within and beyond particular encounters between the storyteller and audience (Cruikshank 1998). The anthropologist Julie Cruikshank argues that, as researchers who encounter stories in fieldwork, we must engage storytellers in "sharing the context for knowing when and why [the story] is told so that conversations can build on that shared knowledge" (1998: xiii). She argues that we should explore the social conditions under which this shared knowledge becomes defined, produced, reproduced, and distributed (or repressed and eliminated) in struggles for legitimacy between different ways of knowing. The point of seeking to understand when and why a story is told is to prevent storytelling from being recast as an object for science, rather than as a system of knowledge that could inform science. This is an important point because "narrative recollections and memories about history, tradition and life experience have to be appreciated in their totality, rather than fragmented into data, if we are to learn anything from them" (Cruikshank 2005: 359).

Drawing from the work of Mikhail Bakhtin, Cruikshank writes, "An enduring value of informal storytelling is its power to subvert official orthodoxies and to challenge conventional ways of thinking . . . such systems of knowledge can be understood as having the power to inform and enlarge other forms of explanation rather than as data for analysis using conventional scholarly paradigms" (1998: xiii). Bakhtin argued that stories have many voices (authors, readers, characters), and considered the dialogic relational possibilities of conversational storytelling as a model that intrinsically opposes authoritarian speech, which seeks to impose a single voice to speech acts (Bakhtin 1984a, 1984b; Clark and Holquist 1984; Cruikshank 1998). Cruikshank continues, "Problems occur when complex stories are wrenched out of context as though their meanings are straightforwardly self-evident—the technocratic and environmental vortices into which such knowledge is swept may submerge narratives while claiming to learn from them" (1998: xvi). Hence, narratives in the context of climate change adaptation research should

be more than data or techniques of engagement, communication, and future research. It matters which stories "tell" stories as a practice of caring and thinking (Haraway 2016).

The Story of a Vulnerability Assessment

In a speech to the local Chamber of Commerce in New Brunswick, Darren McCabe, who was at the time the district coordinator of the Emergency Management Office (EMO) in Charlotte County, recounted the devastating floods that hit southwestern New Brunswick in 2010:

> The storm system rolled into the county overnight, Sunday, December 12. By the early morning of Monday, December 13, we had already seen about 35 millimeters of rain within a few hours. Later that morning, I conferred with a number of government organizations with regards to the severity of the rain event currently affecting the county, and impacts as the hours roll on. We would soon learn from School District 10 officials that they would close all schools at noon. From there and throughout that day, we watched with great concern the rain totally inundating the county. We started to receive more and more reports of roads being impacted and many being closed all over the county. That afternoon, I activated the district Emergency Operations Centre and called the committee to a meeting immediately after work. I advised them of the severe situation and requested some remain in the operations center as we respond to situational updates. I informed all departments that this one was going to be bad and to prepare for the most rainfall in recent memory. Shortly after the supper hour, John Ferguson, St. Stephen town manager, called me to inform me of the quickly deteriorating conditions out on King Street, as well as the water flowing and undermining Milltown Boulevard at the junction. I informed EMO that St. Stephen was preparing to make the declaration of a state of emergency, of which EMO officials discussed with the town. Then the declaration was made. We could only watch in horror as the King Street business district turned into Atlantis and Milltown Boulevard became a waterfall.

Charlotte County is in the southwestern region of the Atlantic province of New Brunswick and is the drainage basin for much of the water received in the province, with three major river systems: the Magaguadavic, Digdeguash, and St. Croix. As McCabe commented, "water runs downhill, and we are at the bottom of the province." Severe weather events have affected Charlotte County for the last several years. A storm in November 2010 battered the region with strong winds, an extremely high tide, and 45 millimeters of rain. Major rainstorms pounded coastal communities in December 2010 and July 2013. In December 2013, a series of intense storm events with freezing rain, ice

pellets, extreme wind chill temperatures, and snowstorms hit the region for an extended period. An estimated 50,000 residences were without power across the province of New Brunswick. Since then, Hurricane Arthur and other storms have hit the region. Together, these events have affected health and household savings, damaged infrastructure, disrupted services and the economy, and caused environmental damage (Signer et al. 2014). Similar events across the province have led the Government of New Brunswick to prioritize flood risk prevention in its climate change adaptation strategy (GNB 2014).

In 2013, Kim Reeder, then the executive director of an NGO called the St. Croix Estuary Project; Donald Killorn, executive director of Eastern Charlotte Waterways; and their intern Kristie Signer organized the Charlotte County Community Vulnerability Assessment (CCCVA) with the support of the New Brunswick Environmental Trust Fund, the Intact Foundation, and the communities involved. They sought to enable Charlotte County communities to share knowledge and concerns relative to climate change, as well as to develop and share information on such topics as socioeconomic systems, sea level rise, and inland flooding (Signer et al. 2014). They organized five working groups from five coastal municipalities, which met biweekly to take part in an interactive community mapping exercise to identify physical, social, economic, and environmental climate vulnerabilities.

The CCCVA process helped reveal which community elements are most sensitive to environmental and climatic changes, and informed the development of efforts to build community resilience (Signer et al. 2014). Several tools were used to coproduce local knowledge, including flooding scenarios—using lidar data and Intergovernmental Panel on Climate Change (IPCC) scenarios to create scenarios of future sea level rises in the region—and wet areas mapping to better understand inland flooding issues (using provincial digital elevation data). The assessment also used participatory vulnerability mapping, which consisted of a series of numbered, community-designated points corresponding to social, environmental, and economic vulnerabilities and assets, subsequently overlain on a community map. I served as an adviser to this process, helping to design the methodology of the project and developing and implementing a pre- and post-survey of participant satisfaction.

As the working groups progressed, they were often interrupted by stories: personal narratives of recent flood events, of the destruction of homes and businesses, or of informal social networks emerging in times of need, as well as stories of anger, disappointment, and frustration at local, regional, and provincial decision-making. We wondered what

we should do with these stories. Some participants stopped attending working group meetings because they sometimes turned into "venting sessions." One commented:

> And what I am finding at [working group] meetings, it was people that were coming out—the majority of people that were coming out were people that had been flooded. They had been directly impacted, so they had an emotional stake in the whole thing and it was hard for them to get passed that sometimes. . . . I figured it was going to be more of a "flood of victims versus the Irvings" [J. D. Irving is a company that owns a local dam]. Because that's more or less how it started. It was much of—pardon my language—pissed-off people wanting to vent their frustrations at the Irvings, blaming the dam for all of their problems. (Interviewee 2)

The CCCVA methodology was meant to elicit specific information, not to solicit stories, and "the organizers asked participants to verbally agree to commit to the entire process to avoid having the working group meetings dominated by participants only intent on venting" (Kim Reeder, personal communication, November 2017). The organizers generally steered the working groups "back on track" when stories overtook the process to complete the vulnerability assessment. Eventually, vulnerability maps were produced, and the results were published in a report (Signer et al. 2014). The stories told during the working group meetings were not included in the report, even if some were mined for data about vulnerabilities, in part because the organizers and I were ill-equipped at the time to "think with" these stories beyond the confines of the vulnerability assessment protocol and the immediate responses that these stories required. Yet, these stories have a stubborn existence. They are a "trouble worth staying with" (Haraway 2016), and they are retold here so that other adaptation researchers can learn from them how and why place-based adaptation stories matter in terms of social power to enact different adaptation strategies, the legitimizing of different forms of knowledges, and the implications for evidence-based adaptation decision-making.

Recursive Methodology

The next discussion explores how storytelling is a world-making practice. Examples illustrate how science and adaptation are stories whose encounters can be made fertile to "recursively" (see Holbraad 2012) inform adaptation research and planning. I draw from the working group meetings, which were video recorded, and from 41 in-depth

qualitative interviews I conducted with CCCVA working group participants to elicit their experiences of extreme weather events, flood response and recovery, how environmental change is affecting them and their communities, and their expectations of the CCCVA process. I conducted these interviews in November 2013, about halfway through the CCCVA process: each lasted about an hour and were recorded and transcribed for accuracy. Over the past few years, I have written about various themes that emerged from these interviews (Klenk et al. 2017, 2018). This article is my attempt to collaborate with the findings of other scholars whose research on storytelling tells "a different tale" (Hulme 2012) about climate change, adaptation, and storytelling.

The Trouble with Vulnerability Maps

I asked interviewees why they had decided to take part in the CCCVA and what they expected from the process. A real estate agent said she participated to gather information that might be useful for her job (Interviewee 7). At the time, because most of the other interviewees said they participated to learn about the effects of climate change, I did not give much thought to the implications of the real estate agent's response. But her response was a harbinger of the trouble at the core of the CCCVA story.

The CCCVA process included experts trained in producing maps of inland flooding risks and future sea level rise scenarios to inform working groups about changing environmental conditions (Signer et al. 2014). Despite the grim scenarios projected for some of these coastal towns (not all were as vulnerable to sea level rises), the information provided to the participants helped them "see" their future. For example, half the downtown area of the town of St. Andrews is expected to be under water within one hundred years because of sea level rise, high tides, and high wind impacts. Historical residences that have been inherited by generations of local families, and whose architectural features are appreciated by the thousands of tourists who visit the town annually, are at risk. The whole town's economic center and its tourism industry will be destroyed by climate change if the community does not adapt. This dismal story line was so bad that it led one participant to disengage from the CCCVA, with his hopes for the future shattered:

> But the other thing that kind of discouraged me, Nicole, at that meeting, is that we spend a lot of time getting presentations about, you know, hap-

penings that maybe other people didn't know about. But like sort of the temperature changes, you know, what would happen in 20 years, and blah . . . That's the kind of stuff I've already been exposed to. Quite a bit through the media. [Laughs and sighs.] And when I hear people say, "In 20 years, or, you know, in 2050, there's going to be sea level rise of two meters," I guess I get a little skeptical. Because . . . [Laughs.] Because I don't know, I just . . . Because if that's the case, if that is really the case, we're in for some you know, drastic, drastic changes. Even here in St. Stephen's. Even though most of the land here is much higher, places like Bangladesh—well, you can just imagine right? Two meters? It's just too much. And so I think that turns off a lot of people as well. They say, "Well, that's hopeless!" What could we do? If there's two meters' rise? I mean basically we'll just have to move entire cities away from where they are. (Interviewee 10)

During the working group meetings, concerns emerged about how the vulnerability assessment and the maps produced would affect real estate values. It is important to note that these coastal communities are situated in a rural, economically depressed region of the province and are increasingly characterized by an aging demographic with low and/ or fixed incomes (Finn 2008; Signer et al. 2014). The development of CCCVA maps that identify at-risk homes and businesses raised concerns about how this information ought to be communicated:

If we suddenly come out with a report that says, "Well, sorry guys, but you are going to have water in your living room in 25 years or whatever"—but these are very contentious. I'm laughing, but I wouldn't be laughing if I owned one of them. These are very contentious issues, and I think there is a liability issue here that the town is going to be facing. In both ways. If they make this [CCCVA] part of the overall plan that these houses and streets aren't going to be developed anymore, they could be liable for some kind of lawsuit there. But they are also liable if they don't point these things out. So I do think that the responsibility of letting this information and projections, which are not proven, be out and discussed in the public domain. It's very contentious, and I think it is bound to be a problem. (Interviewee 34)

Participants wondered how this information would be made available to local citizens and what responsibilities local decision makers and CCCVA participants had toward citizens who were not part of the knowledge-production process. In response, the organizers followed up with presentations of the results to the community and legal studies focused on the town's liability (Kim Reeder, personal communication, November 2017). The CCCVA was supposed to create a story about the effects of climate change and ways to resolve them by bringing together sound science and local knowledge to guide action. The story took an unexpected twist with real material consequences.

This example illustrates the unintended effects of research about adaptation: the potential for science to exacerbate community vulnerability rather than decrease it. The report that resulted from the CCCVA does not mention this problem (Signer et al. 2014), but it still exists. The CCCVA story continues to unfold and affects people even if they are unaware of the CCCVA—just like the garden analogy presented earlier. Real estate agents are now more aware of how climate change will affect local residential and commercial buildings and streets, and CCCVA participants are saddled with not only new knowledge but also feelings of responsibility toward their neighbors who were not at these workshops but whose futures are being narrated. We—those involved in the CCCVA and those not involved but doing adaptation research—must inherit this story and add it to our knowledge and practices of adaptation research, decision-making, and living with climate change.

According to Savransky's (2016a: 50) pragmatic approach, fertile encounters between stories can be achieved only through inquiries into how and to what extent heterogeneous assemblages come to matter to each other and with respect to specific situations:

> The challenge of taking both relations and things seriously amounts to inhabiting a world composed both by heterogeneous relations and beings, relations capable of affecting the nature of beings and bringing new ones into existence, and being capable of affecting the modes of relating, of immanently generating obligations and stubbornly affirming the manners in which a situation matters to them.

In contrast to performative accounts of science that claim that knowledge and reality are entirely produced by particular material-discursive practices (Barad 2007), the advantage of paying attention to encounters is that it *complicates* theories of performativity. If all scientific practices could *simply* bring into being that of which they speak, then presumably the CCCVA would have told a single, unified story and turned the event into the materialization of its own versions of it, very much in abstraction from the disruptive eruption of these unsolicited stories. What allowed these stories to emerge, and, more importantly, what allowed them to be *heard* and taken seriously? Here, the concept of encounter is crucial. The concept of encounter, as necessarily involving a reciprocal attention and negotiation between different versions of stories, is a negotiation concerned with the question of what matters to those whose stories are at stake.

For the CCCVA story, this means it continues to affect people and things, maps and buildings, and adaptation research and action.

It created a new reality with attendant responsibilities, within and outside the research community. This article is an attempt to take responsibility for the CCCVA story—to realize an inventive encounter with an unexpected story. The point is not to explain or integrate different modes of mattering in this kind of story but rather to let it yield questions and obligations related to how we do research and tell adaptation stories. The next section presents unsolicited stories that emerged during the CCCVA process and how their telling matters to adaptation research and practice.

Culverts and Dams: Decentering and Dissenting Stories

The stories that participants told during working group meetings and interviews were not merely an emotive layer, separate and independent from local knowledge. They were not simply therapeutic devices to "let off steam." These lived experiences provide the material-discursive content of local knowledges and vulnerabilities (Whatmore 2013). Interviews with participants revealed that some of the local problems with infrastructure, for example, ineffective stormwater conduits and culverts, were easy to point to as "vulnerable locations" on maps. Many participants recounted the story of the flood of the Billy Weston Brook in St. Stephen:

> There used to be a trestle, behind Down East [a car dealership]. During the 2010 flood, those cars . . . were completely submerged in water. There was that much water that backed up and came all the way back up to the mall, and all those strip malls were completely underwater. And the liquor store, you could canoe to it, and some people did! It was all under water. Because there were only two drainage pipes underneath that area that used to be a full wide open trestle, in that creek. What saved us in 2011 was one gentleman, who works for public works, took a loader and broke through that area to drop the water level. (Interviewee 5)

According to another:

> There was a rail line, and they had a trestle there. And the Billy Weston Brook dumps into the Dennis Stream. And that all dumps into the St. Croix River. And at some point, they replaced the trestle with pipes. And I think the engineers who designed it made a conscious effort. They designed it for a one-hundred-year reserve period. And what we had in 2010 certainly wasn't a one-hundred return period. (Interviewee 19)

Another common story was about the role that dams and their operators had in the flooding of St. George:

A lot of people, mainly people that have been impacted, feel that if the dam was open more quickly and maybe earlier in a flooding state, that flooding wouldn't occur. (Interviewee 33)

Something needs to be done here. Because the way [invited experts in the CCCVA] are talking, we gonna have more flooding. And the water is gonna rise, and there was also mention about the dams. Like there's dams up above, upcountry. They have dams and then they release the water, and I heard one of the dams . . . they just pulled everything so the water all gushed down this way and down there too at the falls. (Interviewee 29)

It's a private dam. With our individual talks with them, nothing had changed until this year. When we had another flooding event in July of this year, and finally after a public consultation with them in August, we asked them if they could at least keep some kind of buffer zone and mostly keep the water level at around 55 or 56 feet as a standard operating procedure. And since then, I don't know if it's because of our lack of rain this year or if they're trying to help us and comply, but since that meeting, the water levels in the lake have been settling. (Interviewee 4)

Participants told stories about poorly designed or ineffective infrastructure, how their businesses and homes were affected during recent floods, and what solutions they thought might mitigate the effects of future flooding. They expressed dissatisfaction not only with decision makers and past decisions about infrastructure but also with the framing of the CCCVA. To understand why storytelling was often disruptive in the CCCVA, we must understand how such stories are related to how local knowledges are conceived in climate change adaptation research and the various governance challenges that researchers have identified in other adaptation case studies. A recent review shows an overwhelming tendency of climate change adaptation scholars to treat local knowledges as a source of data to be extracted, parsed and integrated into adaptation plans without regard to the relations that compose them within and beyond specific research encounters (Klenk et al. 2017). The meaning of local stories is taken to be self-evident, and hence the potential for these stories to legitimize other forms of (narrative) knowledges that are polyvocal and whose meaning is performed in specific research encounters lays fallow in this body of literature. Our understanding of how different versions of stories may have been negotiated within research encounters is limited by research practices that seek to abstract and generalize these stories for an unknown audience.

Governance challenges are similarly described in generalizable and abstract terms derived from case studies of local adaptation research. This body of literature serves to "quiet" the decentering stories of the CCCVA by rendering them just another example of the complexity of

decision-making in the (transcendent) context global environmental change. Moreover, this body of literature, by aggregating data across cases, tends to bury the myriad stories of adaptation heroes, victims, and foes within a plot centered on the trouble with coordinating multiple scales of adaptation decision-making and institutional-enabling factors and constraints. Hence, place-based stories of hope, dreams, and despair and the social power to envision alternative desirable futures get caught up in a vortex of technocratic polycentric decision-making. For example, New Brunswick communities face constraints to local and regional adaptation governance similar to those reported in other regions, including competing and contradictory agendas at the local level (Mukheibir et al. 2013); public risk perceptions and attitudes about risks (Adger et al. 2009; Lieske et al. 2015; Measham et al. 2011); event-driven and short-term policy horizons (Adger et al. 2009; Amundsen et al. 2010; Dannevig and Aall 2015; Measham et al. 2011; Naess et al. 2005); and institutional constraints involving inadequate structures, processes, and distribution of responsibility across decision-making levels, as well as a lack in local capacity (Adger et al. 2009; Amundsen et al. 2010; Measham et al. 2011; Naess et al. 2005). Proposals for more reflexive and responsive adaptation governance arrangements suggest that these reflect the multilevel, polycentric nature of the adaptation problem, and encourage knowledge generation, sharing, and learning from a variety of sources (Emerson and Gerlak 2014; Fossum 2012). Heather Smith and colleagues (2013) conducted a study of river basin planning and spatial planning in Scotland and concluded that a reliance on spatial planning maps may serve to downplay the need for broader discussion and dialogue between community members and decision makers at different scales.

Although the CCCVA process and stories told within it revealed how participating communities felt vulnerable to decisions made upstream from their communities, to understand these stories we must not simply treat the CCCVA as just another case of similar governance challenges reported in the literature described above. For example, working group participants from St. Stephen identified governance challenges to planning for adaptation related to private dam owners controlling the flow of the St. Croix River. Another example is a private company (J. D. Irving Limited) controlling the flow of the Bonny River in the St. George area. Other governance stories related to land-use plans allowing the building of new housing developments in flood plains, while communities already suffered from inadequate stormwater infrastructure. These stories had two major story lines: protagonists were individuals who

needed to take personal responsibility for planning for adaptation, and protagonists were communities that are not in a position to adapt, given the regional scale of the problem. The following excerpts express these story lines:

> Basically, the problem was sewer backup. It was not necessarily flooding. I don't know how you can be sure of that, under the circumstances [a 2008 storm surge event in St. Andrews by-the-Sea]. But that was my experience. And I've been picking off all the things that you do since then. As a householder. An I'm quite interested in what, as a householder, what we can do in the short term to ameliorate the effects of storm surge and backups and so on. Long term—obviously, that is not our department. That's a municipal or provincial problem. But in the short term, I do feel that homeowners can protect themselves to a certain extent. (Interviewee 34)

> What I am missing from around the table [working group] is interaction from municipal and provincial entities. We have one councillor who had been designated to sit there, but he doesn't help much. I don't get a lot of positive ideas out of them. And so there's no real good—there's not a good vibe with the town, or provincial people that take responsibility. Like, the Department of Transportation should be sitting around that table, because we have a provincial highway that runs the whole length of our town. So the town is limited in some areas in what they can do because it's under provincial responsibility. So we should be having all the partners there as well. (Interviewee 17)

The unsolicited stories that participants told during the CCCVA process served to decenter the focus of the assessment—from community-based adaptation to either individual responsibility to adapt and or regional governance of the watershed. Participants challenged the single, unified voice that the maps and scenarios presented. Their stories of dams and culverts were polyvocal. The voices they brought into the CCCVA process redirected attention away from the effects of climate change and toward power struggles over regional decision-making, as well as the perception of adaptation as a personal story of empowerment or victimization. For example, one participant told a story about floods and sewer backups; the protagonist was both a hero and a victim of troubles beyond his control:

> My husband was out in the driveway after dark in December pouring rain, digging out the culverts that the Department of Transportation had not kept care of, to prevent our driveway from washing out. . . . He was 60 at the time, and to this day he is worried that . . . if this December [2013] there's another such thing, there's no way he can be out there at the end of the ditch. And we're still fighting with the Department of Transportation, so three years later we're still trying to get some action. (Interviewee 17)

Storytelling was a means to resist authoritative accounts of local vulnerabilities that gave impunity to critical actors outside the community—dam owners, the Department of Transportation, individuals who were not part of the working groups. Excluding them from the CCCVA story would not do. The fact that these stories were told orally in an unsolicited manner makes them perhaps more readily interpreted as interventions in a polyvocal story of adaptation. Their stubborn existence is a source of tension and ambiguity that the organizers and I had to be responsive to, rather than simply a representation of local vulnerabilities straightforwardly parsed for data. Indeed, the significance of these stories is not only in pointing out local vulnerabilities, which would treat stories only as data. Instead, stories of dams and culverts are about a history of relationships: between people, places, decision makers, and environmental change. Polyvocal stories can be lost, or dismissed, if they are solely represented by a dot on a community vulnerability map.

What I learned from these "disruptive" stories is that they challenged the authority of the CCCVA adaptation story line. They decentered the focus from local to regional, resisted an account of adaptation as the storied achievement of communities, and raised doubts about the ability of any single level of decision-making to be an adaptation hero. They questioned who shapes the story line, and what stories are used to tell individual and collective adaptation stories. Encountering these stories recursively has induced an "experience of hesitation" that "may create the space for the crafting of a problematic togetherness of entities and relations, but also solitudes, or dreams and hopes. A form of togetherness that can never be stabilized, but which constitutes a risk, and a possibility, for a practical and always partial construction of common worlds" (Savransky 2012: 365).

Conclusion: Adaptation as Storytelling

How do we inherit stories that we are told but that were not sought out? Why should we pay attention to stories that punctuate our tidy methodologies and our research about adaptation? In this article, I have moved away from the literature that seeks to develop narrative methods in adaptation science. Instead, I have focused on stories that we do not elicit and the world-making practice of storytelling: "stories becoming-with" (Haraway 2016: 40).

Jerome Bruner (1987) argued that when someone tells you their life story, this is a performative act: a life as led is inseparable from

life as told. Life is not only "how it was" but also how it is interpreted and reinterpreted, told, and retold. Thus, narratives have the power to structure perceptual experience, to organize memory, to segment and purpose-build the very "events" of life. In the end, we become the auto-biographical narratives by which we "tell about" our lives. However, this telling is never done in isolation: as Bakhtin argued, it is a dialogue of multiple voices from the past, present, and future (Brown 2017; see also Ingold 2011: 161). The CCCVA process attempted to create the adaptation story of five communities in southwestern New Brunswick. In this process, individual stories intercepted the CCCVA process, structuring perceptual experience, organizing memory, segmenting responsibilities, and endowing the CCCVA with contested, polyvocal story lines. Who decides how the story of the CCCVA will be told is a story in itself. My argument is that the CCCVA and participants' stories are not cultural constructs that are separate and independent from reality. Rather, they are realities-in-the-making. Adaptation is a storied achievement. Climate science and vulnerability assessments are discursive apparatuses that intervene in the unfolding of local, regional, and global stories of global environmental change adaptation and governance.

However, for evidence-based policy making in adaptation governance, the evidentiary standard at the science-policy interface most commonly performed through knowledge assessments (e.g., the IPCC) seems to leave little space for "hearing" polyvocal adaptation stories. The challenge is not simply about adjusting the evidentiary norms to include anecdotes and case studies. Rather, it requires demonstrating how such knowledge assessments, whatever their scale of focus, are more than knowledge integration practices: they are narratives that produce authoritative accounts of events, they legitimize some forms of knowledges and not others, and they carefully curate an imaginary of the future in an effort to spur action. Just like researchers conducting community-based adaptation research, global environmental change researchers working at the science-policy interface must come to terms with how knowledge assessments are narratives that intervene in the (potentially alternative) paths of development of individuals, communities, and nations. Although it is not my intent here to substantiate this latter argument, this article shows how adaptation stories are polyvocal despite attempts to circumscribe them through rigorous research protocols. In the interstices of data extraction, model building, scenario planning, and knowledge integration crop up stories that resist attempts to be told within a grand narrative of a single desirable future. The narrative turn I am proposing in climate change adaptation research is

a necessary move to take responsibility for what stories we use to tell others stories with.

This encounter between the lived experiences, concerns, and aspirations of participants and the CCCVA process is a good illustration of how science about adaptation can create new vulnerabilities rather than mitigate them. It is important to understand the context of its telling. Most recent research on narratives in climate change research takes a representationalist perspective on stories, yet doing this has consequences that should make us careful about how we tell adaptation stories. This example provides good evidence for the need to care for and take responsibility for our research questions, experimental apparatus, and global environmental change narratives. A good story is often a good counsel, giving us good reasons to act in a certain way and guiding decision-making when we are faced with complex problems (Thiele and Young 2016). In this case, the CCCVA story should make us think about the role of science as enmeshed in the ongoing adaptation of day-to-day life and of community-based adaptation planning. Knowledge-making practices can create new realities to which we must adapt.

Acknowledgments

Nicole Klenk is Assistant Professor of Environmental Studies at the University of Toronto, Canada. Her research focuses on the politics of knowledge production at the science-policy interface and within transdisciplinary research approaches. Her current project seeks to enliven the metaphor of "meshwork" to characterize scientific practices. This metaphor refers to how individuals and knowledges are entanglements; they emerge through encounters with others; as "lines of becoming," they are not preexistent, self-contained, and separate entities. Meshwork is also about becoming skillful in recognizing entanglements and, through mindful practice, creating new possibilities for the flourishing of life along diverse lines. Email: nicole.klenk@utoronto.ca

References

Adger, W. Neil, Suraje Dessai, Marisa Goulden, Mike Hulme, Irene Lorenzoni, Donald R. Nelson, Lars Otto Naess, Johanna Wolf, and Anita Wreford. 2009. "Are There Social Limits to Adaptation to Climate Change?" *Climatic Change* 93 (3–4): 335–354. https://doi.org/10.1007/s10584-008-9520-z.

Amundsen, Helene, Frode Berglund, and Hege Westskog. 2010. "Overcoming Barriers to Climate Change Adaptation: A Question of Multilevel Governance?" *Environment and Planning C: Government and Policy* 28 (2): 276–289. https://doi.org/10.1068/c0941.

Bakhtin, Mikhail M. 1984a. *The Dialogic Imagination*. Austin: University of Texas Press.

Bakhtin, Mikhail M. 1984b. *Rabelais and His World*. Trans. Helene Iswolsky. Bloomington: Indiana University Press.

Barad, Karen. 2003. "Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter." *Signs: Journal of Women in Culture and Society* 28 (3): 801–831. https://doi.org/10.1086/345321.

Barad, Karen. 2007. *Meeting the Universe Halfway. Quantum Physics and the Entanglement of Matter and Meaning*. Durham, NC: Duke University Press.

Bremer, Scott, Anne Blanchard, Nabir Mamnun, Mathew Stiller-Reeve, Md. Mahfujul Hacque, and Endre Tvinnereim. 2017. "Narrative as a Method for Eliciting Tacit Knowledge of Climate Variability in Bangladesh." *Weather, Climate and Society* 9 (4): 669–686. https://doi.org/10.1175/WCAS-D-17-0007.1.

Brown, Philip. 2017. "Narrative: An Ontology, Epistemology and Methodology for Pro-environmental Psychology Research." *Energy Research and Social Science* 31: 215–222. https://doi.org/10.1016/j.erss.2017.06.006.

Bruner, Jerome. 1987. "Life as Narrative." *Social Research* 54 (1): 11–32.

Bushell, Simon, Thomas Colley, and Mark Workman. 2015. "A Unified Narrative for Climate Change." *Nature Climate Change* 5: 971–973. https://doi.org/10.1038/nclimate2726.

Clark, Katerina, and Michael Holquist. 1984. *Mikhail Bakhtin*. Cambridge, MA: Harvard University Press.

Cruikshank, Julie. 1998. *The Social Life of Stories: Narrative and Knowledge in the Yukon Territory*. Lincoln: University of Nebraska Press.

Cruikshank, Julie. 2005. *Do Glaciers Listen? Local Knowledge, Colonial Encounters and Social Imagination*. Vancouver and Seattle: University of British Columbia Press and University of Washington Press.

Dannevig, Halvor, and Carlo Aall. 2015. "The Regional Level as Boundary Organization? An Analysis of Climate Change Adaptation Governance in Norway." *Environmental Science and Policy* 54: 168–175. https://doi.org/10.1016/j.envsci.2015.07.001.

Doerfler, Jill, Heidi Kiiwetinepinesiik Stark, and Niigaanwewidam James Sinclair. (Eds.) 2014. *Centering Anishinaabeg Studies: Understanding the World Through Stories*, East Lansing and Winnipeg: Michigan State University Press and University of Manitoba Press.

Emerson, Kirk, and Andrea K. Gerlak. 2014. "Adaptation in Collaborative Governance Regimes." *Environmental Management* 54 (4): 768–781. https://doi.org/10.1007/s00267-014-0334-7.

Finn, Jean-Guy. 2008. *Building Stronger Local Governments and Regions: An Action Plan for the Future of Local Governance in New Brunswick*. Report of the Commissioner on the Future of Local Governance. New Brunswick, NJ: Ministry of Environment and Rural Affairs. http://www2.gnb.ca/content/dam/gnb/Departments/lg-gl/pdf/BuildingStrongerLocalGovernmentsAndRegions.pdf.

Flottum, Kjersti, and Øyvind Gjerstad. 2017. "Narratives in Climate Change Discourse." *Wiley Interdisciplinary Reviews: Climate Change* 8 (1): 1–15. https://doi.org/10.1002/wcc.429.

Fossum, John Erik. 2012. "Reflections on Experimentalist Governance." *Regulation and Governance* 6 (3): 394–400. https://doi.org/10.1111/j.1748-5991.2012.01158.x.

Garroutte, Eva Marie, and Kathleen Delores Westcott. 2014. "The Story Is a Living Being. Companionship with Stories in Anishinaabeg Studies." In *Centering Anishinaabeg Studies: Understanding the World Through Stories*, ed. Jill Doerfler, Heidi Kiiwetinepinesiik Stark, and Niigaanwewidam James Sinclair, 61–79. East Lansing and Winnipeg: Michigan State University Press and University of Manitoba Press.

GNB (Government of New Brunswick). 2014. *New Brunswick's Flood Risk Reduction Strategy*. New Fredericton: New Brunswick Department of Environment and Local Government. http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Flooding-Inondations/NBFloodRiskReductionStrategy.pdf.

Gottschall, Jonathan. 2012. *The Storytelling Animal: How Stories Make Us Human*. Boston: Houghton Mifflin Harcourt.

Haraway, Donna J. 2016. *Staying with the Trouble: Making Kin in the Chthulucene*. Durham, NC: Duke University Press.

Holbraad, Martin. 2010. "Ontology Is Just Another Word for Culture." *Critique of Anthropology* 30 (2): 179–185.

Holbraad, Martin. 2012. *Truth in Motion: The Recursive Anthropology of Cuban Divination*. Chicago: University of Chicago Press.

Holbraad, Martin, Morten Axel Pedersen, and Eduardo Viveiros de Castro. 2014. "The Politics of Ontology, Anthropological Positions." *Cultural Anthropology*, 13 January. https://culanth.org/fieldsights/462-the-politics-of-ontology-anthropological-positions.

Hulme, Mike. 2012. "'Telling a Different Tale': Literary, Historical and Meteorological Readings of a Norfolk Heatwave." *Climatic Change* 113 (1): 5–21.

Ingold, Tim. 2011. *Being Alive. Essays on Movement, Knowledge and Description*. London: Routledge.

Jackson, M. Jerilynn. 2015. "Glaciers and Climate Change: Narratives of Ruined Futures." *Wiley Interdisciplinary Reviews: Climate Change* 6 (55): 479–492. https://doi.org/10.1002/wcc.351.

Kok, Kasper, Ilona Bärlund, Martina Flörke, Ian Holman, Marc Gramberger, Jan Sendzimir, Benjamin Stuch, and Katarina Zellmer. 2015. "European Participatory Scenario Development: Strengthening the Link between Stories and Models." *Climatic Change* 128 (3–4): 187–200. https://doi.org/10.1007/s10584-014-1143-y.

Klenk, Nicole, Dragos Flueraru, and James I. MacLellan. 2017. "Experimentalist Regional Governance for Climate Change Adaptation: A Canadian Case Study." In *Climate Change Adaptation in North America: Experiences, Case Studies and Best Practice*, ed. Walter Leal Filho and James M. Keenan, 50–66. Berlin: Springer.

Klenk, Nicole, James I. MacLellan, Dragos Flueraru, and Kim Reeder. 2017. "Climate Hazards, Local Knowledge Co-production, and the Emergence of Climate Adaptation Publics: Governance Implications." In *Climate Change Impacts and Adaptation Strategies in Costal Communities*, ed. Walter Leal Filho, 261–281. Berlin: Springer.

Lejano, Raul P., Joana Tavares-Reager, and Fikret Berkes. 2013. "Climate and Narrative: Environmental Knowledge in Everyday Life." *Environmental Science and Policy* 31: 61–70. https://doi.org/10.1016/j.envsci.2013.02.009.

Lieske, David J., Lori Ann Roness, Emily A. Phillips, and Michael J. Fox. 2015. "Climate Change Adaptation Challenges Facing New Brunswick Coastal Communities: A Review of the Problems and a Synthesis of Solutions Suggested by Regional Adaptation Research." *Revue d'Études Sur Le Nouveau Brunswick* 6 (1): 32–54.

Measham, Thomas G., Benjamin L. Preston, Timothy F. Smith, Cassandra Brooke, Russell Gorddard, Geoff Withycombe, and Craig Morrison. 2011. "Adapting to Climate Change through Local Municipal Planning: Barriers and Challenges." *Mitigation and Adaptation Strategies for Global Change* 16 (8): 889–909. https://doi.org/10.1007/s11027-011-9301-2.

Moezzi, Mithra, Kathryn B. Janda, and Sea Rotmann. 2017. "Using Stories, Narratives, and Storytelling in Energy and Climate Change." *Energy Research and Social Sciences* 31: 1–10. https://doi.org/10.1016/j.erss.2017.06.034.

Morgan, Mary S. 2017. "Narrative Ordering and Explanation." *Studies in History and Philosophy of Science* 62: 86–97. https://doi.org/10.1016/j.shpsa.2017.03.006.

Mukheiber, Pierre, Natasha Kuruppu, Anna Gero, and Jade Herriman. 2013. "Overcoming Cross-Scale Challenges to Climate Change Adaptation for Local Government: A Focus on Australia." *Climatic Change* 121 (2): 271–283. https://doi.org/10.1007/s10584-013-0880-7.

Naess, Lars Otto, Guri Bang, Siti Eriksen, and Jonas Vevatne. 2005. "Institutional Adaptation to Climate Change: Flood Response at the Municipal Level in Norway." *Global Environmental Change* 15 (2): 125–138. https://doi.org/10.1016/j.gloenvcha.2004.10.003.

Paschen, Jana-Axinja, and Ray Ison. 2014. "Narrative Research in Climate Change Adaptation: Exploring a Complementary Paradigm for Research and Governance." *Research Policy* 43 (6): 1083–1092. https://doi.org/10.1016/j.respol.2013.12.006.

Polkinghorne, Donald E. 1988. *Narrative Knowing and the Human Sciences*. Albany: State University of New York Press.

Savransky, Martin. 2012. "Worlds in the Making: Social Sciences and the Ontopolitics of Knowledge." *Postcolonial Studies* 15 (3): 351–368. https://doi.org/10.1080/13688790.2012.753572.

Savransky, Martin. 2016a. *The Adventure of Relevance: An Ethics of Social Inquiry*. London: Palgrave Macmillan.

Savransky, Martin. 2016b. "Modes of Mattering: Barad, Whitehead, and Societies." *Rhizomes: Cultural Studies in Emerging Knowledge* 30. http://www.rhizomes.net/issue30/savransky.html.

Signer, Kristie, Kim Reeder, and Donald Killorn. 2014. *Community Vulnerability Assessment of Climate Change and Variability Impacts in Charlotte County, New Brunswick*. Report of St. Croix Estuary Project (SCEP) and Eastern Charlotte Waterways (ECW). New Brunswick: SCEP and ECW.

Smith, Heather M., Gill Wall, and Kristy L. Blackstock. 2013. "The Role of Map-Based Environmental Information Supporting Integration between River Basin Planning and Spatial Planning." *Environmental Science and Policy* 30: 81–89. https://doi.org/10.1016/j.envsci.2012.07.018.

Thiele, Leslie Paul, and Marshall Young. 2016. "Practical Judgment, Narrative Experience and Wicked Problems." *Theoria* 148 (63): 35–52. https://doi.org/10.3167/th.2016.6314803.

Whatmore, Sarah J. 2013. "Earthly Powers and Affective Environments: An Ontological Politics of Flood Risk." *Theory, Culture and Society* 30 (7–8): 33–50. https://doi.org/10.1177/0263276413480949.